observing Geographically Correlated Errors in the Orbit of TOPEX/POSEIDON using GPS

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The GPS precise orbit determination (POD) experiment o n '1'01'1 EX/POSEIDON has demonstrated the. capability of GPS for highly precise positioning of altimetric satellites. Especially promising is the "reduced dynamic" tracking technique, which has yielded orbits with estimated radial accuracies of 3 cm (rms). This technique exploits the continuous, multidirectional nature of GPS tracking to make local corrections to a conventional dynamic orbit. In this presentation, we examine differences between dynamic and reduced-dynamic orbits for evidence of geographically correlated errors attributable to mismodeling of the gravity field. Both GPS- and SLR/Doris-based dynamic orbits are considered. Our results suggest that the pre-launch gravity model (JGM- 1) introduces radial orbit errors which, when projected on a mean sea surface, can be approximated as a large-scale positive anomaly in the Indian Ocean and a large-scale negative anomaly in the eastern Pacific Ocean. The global distribution and magnitude of these geographically correlated errors are consistent with the errors predicted by applying linear orbit perturbation theory to the gravity field covariance. Repeating the analysis with the post-launch gravity mode] (J GM-2) suggests that a portion of the meridional dependence observed in JGM - 1 still remains. Such an anomaly can have. important implications on modeling the global circulation pattern of the world's oceans, which is the principal goal of TOPI VU} /POSEIDON.